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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/763,453 | 01/23/2004 | Antonio Criminisi | MS1-1772US | 3630 |
| 22971 | 7590 | 08/28/2007 | | |
| MICROSOFT CORPORATION ONE MICROSOFT WAY REDMOND, WA 98052-6399 | | | EXAMINER LIEW, ALEX KOK SOON | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2624 | |
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| | | | 08/28/2007 | ELECTRONIC |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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|------------------------------|-------------------------------|----------------------------------|--|
| Office Action Summary | Application No. 10/763,453 | Applicant(s) CRIMINISI ET AL. | |
| | Examiner Alex Liew | Art Unit 2624 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-39 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-9,11-14,16-21,23-26,28-33 and 35-39 is/are rejected.
- 7) ☒ Claim(s) 3,10,15,22,27 and 34 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

Claims 3, 10, 15, 22, 27 and 34 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

With regards to claim 3, the examiner cannot find any applicable prior art and / or suggestions disclosing setting the pixel value of the integer position on the virtual image plane to a pixel value from one or more integer positions of the first image that corresponds with the projected point on the stereo disparity surface, if one or more integer positions of the second image that corresponds with the projected point on the stereo disparity surface are occluded in combination with all the limitations of claim 1.

With regards to claim 10, the examiner cannot find any applicable prior art and / or suggestions disclosing projecting the center of projection through the projected point on the stereo disparity surface to a floating point position on the virtual image plane and projecting an integer position on the virtual image plane to identify the projected point on the stereo disparity surface, the integer position being adjacent to the floating point position on the virtual image plane in combination with all the limitations in claim 1.

With regards to claims 15 and 27, see the rationale for claim 3.

With regards to claims 22 and 34, see the rationale for claim 10.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 2, 4 – 6, 8, 9, 13, 14, 16 – 18, 20, 21, 25, 26, 28 – 30, 32, 33, 37 – 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen (US pat no 6,556,704) in view of Anandan (US pat no 6,198,852).

With regards to claim 1, Chen discloses a method comprising

- computing a stereo disparity surface between a first image and a second image of a stereo image pair (see figure 1 – 13a and 13b; the disparity is computed using equation shown equation 2);
- computing an integer position on a depth image plane from a projection between the virtual image plane and a center of projection through a projected point on the stereo disparity surface to the depth map image plane (see figure 4, the integer position is $P(X_P, Y_P, Z_P)$); and

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- setting a pixel value of the integer position on the depth image plane based on the projected point on the stereo disparity surface (see figure 1, 10 is a depth map image where all the disparity points are computed at all integer positions).

Chen suggests depth maps are useful technique to generated virtual images (see column 3, lines 10 – 15). Anandan discloses generating virtual image from using images taken from plurality of point of views (see column 3, lines 22 – 28). One skilled in the art would include generating virtual images because points in the virtual image are related to the 3D location point of the scene (see Anandan column 3, lines 60 – 35), which helps in locating and extracting the object in the image.

With regards to claim 2, an extension to the arguments to claim 1, Anandan discloses setting the pixel value of the integer position on the virtual image plane as a weighted average of pixel values from integer positions of the first and second images that correspond with the projected point on the stereo disparity surface, if the integer positions of the first and second images that correspond with the projected point on the stereo disparity surface are not occluded (see column 18, lines 63 – 66, there are no occlusion shown in figure 5 while the cameras capture image of the object, 525). One skilled in the art would include averaging the two images at the same point because to obtain a value closest to the actual image value, improving recognition of the image object.

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With regards to claim 4, Chen reads a method of claim 1, wherein the center of projection is translatable in a plane parallel to the virtual image plane (see figure 4, the top or bottom image reads on the plane which is parallel to the depth map; the center of projection is the line segment from point P to X_p).

With regards to claim 5, Chen discloses a method of claim 1, wherein the center of projection is translatable along a normal axis from the virtual image plane (see figure 4, line 74b to 75 is related to line P to X_p by a right angle with part of the baseline being the height of the right triangle).

With regards to claim 6, Chen reads on the center of projection maps to a virtual camera position (see figure 1, image 10 is between the top and bottom image).

With regards to claim 8, Chen reads on projecting the center of projection through the projected point on the stereo disparity surface to the depth map (in figure 4, line from point P to X_p is the center of projection, where point P is the center of the projection point, also known as the projection plane).

With regards to claim 9, Chen reads on a method of claim 1, wherein the operation of computing an integer position on the virtual image plane comprising projecting the center of projection the projected point on the stereo disparity surface to the depth map

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image, the projected point bring at an integer position on the stereo disparity surface (see figure 4, point P is a projected point of images 13a and 13b; the position values of an image is usually identified as a two coordinate, index number, eg. (a,b), where a and b are integers), but does not disclose generating a virtual image. Anandan discloses generating virtual image. See the motivation of claim 1.

With regards to claims 13 and 25, see the rationale and rejection for claim 1.

With regards to claims 14 and 26, see the rationale and rejection for claim 2.

With regards to claims 16 and 28, see the rationale and rejection for claim 4.

With regards to claims 17 and 29, see the rationale and rejection for claim 5.

With regards to claims 18 and 30, see the rationale and rejection for claim 6.

With regards to claims 20 and 32, see the rationale and rejection for claim 8.

With regards to claims 21 and 33, see the rationale and rejection for claim 9.

With regards to claims 37 – 39, see the rationale and rejection for claim 1.

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3. Claims 7, 19 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen ('704) in view of Anandan ('852) as applied to claim 1 further in view of Cohen (US pat no 6,023,523).

With regards to claim 7, Chen discloses all the limitations discussed in claim 1, but does not disclose applying a projection matrix to a centered point in the virtual image plane to determine the location of the point on the virtual image plane. Cohen reads on applying a projection matrix to a centered point in the virtual image plane to determine the location of the point on the virtual image plane (see figure 14, the t-s plane is the projection matrix and there are plurality of center points applied to the virtual image plane, u-v plane). One skilled in the art would include projecting a projection matrix on to the center point in the virtual image because one needs to set an origin in any coordinate system, for example Cartesian coordinate (vertical and horizontal coordinates), to locate and even assign a location for of an integer position.

With regards to claims 19 and 31, see the rationale and rejection for claim 7.

4. Claims 11, 12, 23, 24, 35 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen ('704) in view of Anandan ('852) as applied to claim 1 further in view of Allmen (US pat no 6,738,424).

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With regards to claim 11, Chen discloses all the limitations discussed in claim 1, but does not disclose computing pixel value using bilinear interpolation. Allmen discloses step of setting the pixel value associated with the integer position on the virtual image plane to a pixel value associated with the integer position on the virtual image plane to a pixel value computed as a bilinear interpolation of pixel values from integer positions on the first and second images (see column 19, lines 37 – 46, the two images are shown in figure 8), each integer pixel position being corresponding to the integer position on the virtual image plane through an inverse mapping point on the stereo disparity surface (see column 13, lines 54 – 64). One skilled in the art would include bilinear interpolation because interpolation technique does not require approximation of all the pixels in the three-dimensional image, which save processing power and time.

With regards to claim 12, see the rationale and rejection for claim 11. In addition, the first image is shown in Allmen of figure 8 in image 1.

With regards to claims 23 and 35, see the rationale and rejection for claim 11.

With regards to claims 24 and 36, see the rationale and rejection for claim 12.

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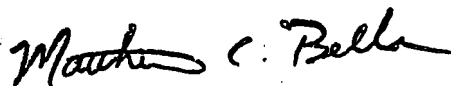
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alex Liew whose telephone number is (571)272-8623. The examiner can normally be reached on 9:30AM - 7:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Bella can be reached on (571) 272-7778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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8/13/07



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